

Correlation of Quaternary Chronologies Symposium

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mations of sedimentary sections. The strength of completeness estimates lies in the fact that no such assumptions need to be made. Completeness estimates make no predictions as to the distribution of gaps versus temporal intervals represented by sediment in a particular stratigraphic section.

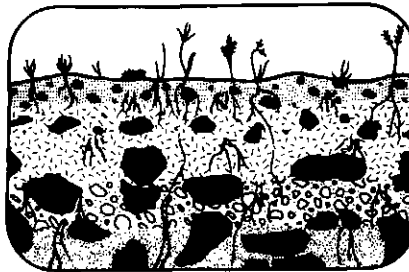
D. Schindel also presented his "habitat-shift" model in which gaps in the stratigraphic record are considered to correspond to interruptions in within-populational processes of the organisms (later preserved as fossils) living in the particular depositional environment. As a palaeontologist, I question this model. I see no *a priori* reason why periods of sediment accumulation necessarily have any correlation with hospitable or inhospitable conditions for organisms which later die and are preserved in the sediments. For example, in the Eocene Bighorn Basin fluvial system (discussed by P. Gingerich in the same session) the mobile mammals would have been relatively independent of the exact coordinates of the river system, while for many marine organisms relatively high rates of sedimentation (perhaps burying the organisms in sediment), rather than profound breaks in sedimentation, might represent the most inhospitable conditions. The following methodologies and taxonomic groups were also considered by various speakers in the symposium on time resolution: time resolution using magnetostratigraphy; analysis of biometric characters in foraminiferans; and time resolution using Holocene pollen, megafloora assemblages, marine benthic invertebrates and terrestrial mammal fossil assemblages.

A short symposium on the palaeobiology of Foraminifera was also held on Saturday afternoon, as was a symposium on palaeontological innovations in the eighties. In the former symposium J. Kennett, B. Malmgren and M. Srinivasan presented their evidence for gradual, steady and continuous change in the *Globorotalia* lineage during eight million years. In the latter, a number of new techniques and technologies were described and discussed, such as applications of scanning electron microscopy, accelerator mass spectrometry and fluorescence of palynomorphs to palaeontology and stratigraphy; quantitative biostratigraphy; computer retrieval of biostratigraphic data; and voice access to computers for palaeontological data.

Finally, a general poster session was held on Saturday. This session included a broad range of specialized topics, such as stromatoporeid ecostratigraphy and the upper Ordovician glacial episode; ichthyolith (microscopic fish skeletal fragments) biostratigraphy across the Cretaceous-Tertiary boundary; and case studies of the

evolution of various Foraminifera and Radiolaria.

Overall, this was a most exciting and well-attended convention. Abstracts of the papers were published before the meeting as a supplement to volume 56, number 2 of the *Journal of Paleontology* (March, 1982). A two volume set entitled *Third North American Paleontological Convention Proceedings* (B. Mamet and M. J. Copeland, eds., 1982, Business and Economic Service Limited, Toronto, 599 pages) was also published and distributed at the convention.



Correlation of Quaternary Chronologies Symposium

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Quaternary scientists from Canada, U. S. A., U. K., Sweden, Denmark, West Germany, Estonia (USSR), Poland, France, South Africa and New Zealand convened at York University in Toronto from May 26-30, 1983, to discuss Quaternary records. Chronologies were examined from various points of view, including the radiocarbon time scale, vertebrate, paleomagnetic and paleosol records, and glacial/interglacial sequences. This conference proved to be a logical extension of the 1981 York Symposium on *Dating Methods*, the proceedings of which are to be published shortly by A. M. Dowden, Box 188, Stroudsburg, PA18360.

The first session on long range time scales, chaired by C. S. Churcher (U. of Toronto) and D. Easterbrook (Western Washington State U.), opened with a discussion by H. B. S. Cooke (White Rock, B. C.) on the reconciliation of different chronologies. He reviewed the multidisciplinary approach required to achieve a precise subdivision of key horizons in the Quaternary as well as the problems involved in correlation between the continental and

marine records. He stressed the need for further studies of loess sequences in North America. The extension of the radiocarbon time scale by accelerator mass spectrometry was discussed by R. E. Taylor *et al.* (U. of California, Riverside), and P. Fritz (U. of Waterloo) assessed problems associated with ¹⁴C dating of marl deposits.

The session continued with an important summary of the chronology of late Cenozoic climates in Africa by E. M. van Zinderen Bakker (U. of The Orange Free State, Bloemfontein, South Africa), and a description by J. Terasmae (Brock U.) of using palynostratigraphy for correlation of deposits. Next, W. Vortisch (U. of Marburg, W. Germany) discussed clay minerals and their use in correlating tills in north-western Europe.

The afternoon session on Thursday, chaired by B. D. Fahey (Guelph U.), and I. J. Smalley (U. of Waterloo), began with a paper on long time scales derived from cave deposits in North America by D. Ford (McMaster U.). This concluded the first set of papers. The second group of papers, on the paleomagnetic record, began with R. Barendregt (U. of Lethbridge) and A. MacS. Stalker (Geological Survey of Canada, Ottawa), who discussed the paleomagnetic correlation of older Quaternary deposits in the Canadian prairies. The use of paleomagnetic data from tills and other glacial drifts was assessed by D. J. Easterbrook and J. S. Mothersill (Lakehead U.), followed by a discussion on the correlation of lacustrine deposits using paleomagnetism.

The third session was on the vertebrate record. C. A. Repenning (U. S. G. S., Menlo Park, Calif.) opened with a summary of Quaternary rodent biochronologies and their correlation with paleoclimatic and paleomagnetic events leading to a synthesis of Quaternary stratigraphy for North America. The paleoecology of an early Pleistocene cenote in Hannover Quarry, PA, was discussed by E. B. Evenson *et al.* (Lehigh U., Bethlehem, PA) and K. E. Luchterhand (Field Museum of Natural History, Chicago, Ill) considered the evolution of tropical terrestrial communities in the late Cenozoic. This third session continued on Friday, May 27, chaired by C. Burrows (U. of Canterbury, Christchurch, N. Z.) and A. MacS. Stalker. The first paper, by C. S. Churcher, dealt with faunal correlations of Pleistocene deposits in Western Canada. He provided corroborative evidence for the antiquity of older Pleistocene glacial deposits in Saskatchewan previously discussed by R. Barendregt. Early postglacial mammalian faunas in the Bighill Creek Formation of Alberta and their importance in understanding Pleistocene extinctions formed the main topic of discussion by M. C. Wilson (U. of Calgary).

The last paper, given by C. R. Harington, (National Museums of Canada, Ottawa) dealt with *Soergelia*, an indicator of Holarctic middle Pleistocene deposits.

A. Billard (C. N. R. S., Paris) opened the fourth group of papers, dealing with paleosol records, on Friday morning, with a presentation of the stratigraphic importance of paleosols in the Alps. The use of soils in reconstructing glacial history in the Chic Choc Mountains, Gaspésie, was evaluated by J. T. Gray (U. Q. A. M.) and C. Wang and G. J. Ross (Agriculture Canada, Ottawa). Then N. W. Rutter and P. L. Waters (U. of Alberta) evaluated the use of paleosols and tephra in correlating Holocene deposits in southern Alberta. The afternoon session on Friday was chaired by N. W. Rutter and W. Vortisch. It began with a discussion by W. C. Mahaney *et al.* of the glacial chronology in the Rocky Mountains. The last paper on Quaternary paleosols in the Canadian Rocky Mountains, and their significance in forming a chronological framework, was presented by R. King (U. of Western Ontario).

The fifth group of papers reviewed the glacial/interglacial record. It began on Friday afternoon with a discussion of the glacial sequence in Greenland by S. Funder (Geologisk Museum, Copenhagen, Denmark). Then W. Karlen (U. of Stockholm, Sweden) evaluated dendrochronology and its use in verifying glacial chronologies, followed by a paper on the late Cenozoic record on Banks Island, N. W. T., Canada, by J. S. Vincent (G. S. C., Ottawa). The topics then shifted to eastern Canada, with D. R. Grant (G. S. C., Ottawa) discussing the terrestrial record in Atlantic Canada and its correlation with offshore sediment cycles, and R. Stea (Nova Scotia Dept. of Mines & Energy) spoke on the surface mapping and correlation of ice flow changes in central Nova Scotia. Bog bottom ^{14}C dates and their importance in reevaluating glacial chronologies in the eastern U. S. were assessed and critically examined by J. Cotter *et al.* (Lehigh U., Bethlehem, PA).

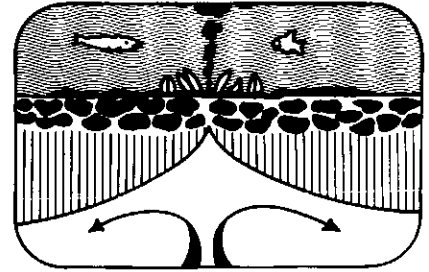
The fifth session continued on Saturday, May 28, chaired by H. B. S. Cooke and S. Funder. The first paper, by C. Burrows, dealt with problems of age assignment, correlation and environmental interpretation of the New Zealand Quaternary. This was followed by two papers given by I. J. Smalley on the 5th Paleosol Project and on the correlation of the loess sheets of New Zealand with those of Eurasia. Late Quaternary glacial chronologies in North America were discussed by D. F. Eschman (U. of Michigan, Ann Arbor), Q. H. J. Gwyn *et al.* (U. of Sherbrooke), Mark M. Fenton (Alberta Geological Survey) and N. and C. H. Eyles (U. of Toronto).

The Saturday afternoon session was chaired by B. Luckman (U. of Western Ontario) and O. L. White (Ontario Geological Survey). It began with a discussion by E. Derbyshire (U. of Keele, U. K.) of the Pleistocene lithostratigraphy in northeast England. Isotope-geochemical chronologies derived from glaciers in the Eurasian arctic were described by R. Vaikmäe, and J. M. Punning (Estonian Academy of Sciences, USSR) and F. Mayr (U. Q. A. M.) evaluated the possible magnetic control of climate and its geological implications.

The last group of papers dealt exclusively with the mountain and coastal areas of western North America. D. R. Butler *et al.* (Oklahoma State U., Stillwater) considered the glacial/interglacial sequence in the Lemhi Mountains, Idaho; S. M. Colman and K. L. Pierce (U. S. G. S., Denver, CO) used weathering rinds to correlate glacial deposits in the western U. S.; and T. C. Meierding (U. of Delaware, Newark) evaluated the correlation of alpine deposits using relative dating methods. The use of multiple methods for establishing the Pleistocene stratigraphy in Western British Columbia was examined by S. R. Hicock (U. of Western Ontario). The depositional history and correlation of three major river terraces in the Willamette Valley, Oregon, were reviewed by M. C. Roberts (Simon Fraser U.).

The papers were followed by two field trips in the Toronto area. The first trip, led by E. V. Sado, O. L. White, P. J. Barnett and D. R. Sharpe, was organized to investigate the glacial geology of the North Toronto area. The second field trip, led by C. H. and N. Eyles, was planned to investigate the sedimentary processes that operate on the floors of large proglacial lakes.

The proceedings of the Symposium will be published (in 1984) by Geoabstracts Ltd., Regency House, 34 Duke Street, Norwich, U. K., NR3 3AP.



Geodynamics Symposium on the Oceanic Lithosphere.

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Texas A&M is in the process of developing a vigorous program in Geodynamics. John Handin, well known for his work in fundamental rock mechanics, was perhaps the originator of the concept, which is now being developed by Tom Hilde, George Sharman and others, with the support of Dean Mel Friedman and Seiyi Uyeda of Tokyo, a regular visitor at A&M. Additional incentive to the group has come from the decision that A&M will manage the next phase of the deep-sea drilling program. A&M are ideally suited in an environment with access to great expertise in drilling technology.

A&M are now organizing annual conferences on various aspects of ocean floor geodynamics. Their meeting on subduction of two years ago was perhaps one of the most exciting symposia W. S. Fyfe has recently attended. The proceedings, edited by Tom Hilde, will shortly appear as a special issue of *Tectonophysics*. The meeting reported here was no less exciting. Our congratulations must go to all who were involved.

The meetings are informal and allow a high degree of discussion and critical appraisal of what we do and do not know, a great pleasure in comparison with the massive national meetings. Student participation is extensive.

Parts of the present meeting which impressed us included the following:

New observations on the E. Pacific Rise are showing that structures are much more complex than commonly have been described. In particular, Francheteau and MacDonald described overlapping centres, two parallel ridges 12 km apart and perhaps overlapping for tens of kilometres. Between the two centres is a depressed zone. Obviously such zones raise questions about the geometry of the magma chambers feeding the two volcanic centres